**UNIT 1 ALCHEMY Section I: Lessons 1-5**

**LESSON 1: TOOLS OF THE TRADE – LAB EQUIPMENT & SAFETY**

See Handout on lab safety rules

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**LESSON 2: A PENNY FOR YOUR THOUGHTS**

A) The Roots of Chemistry

1. More than a thousand years ago, early alchemists tried to turn ordinary metals into gold.

2. Alchemists made important contributions to modern chemistry.

3. A **hypothesis** is a possible explanation for an observation.

4. **Properties** are characteristics of a substance or object.

B) Chemistry: The Study of Matter and Change

1. **chemistry** is the study of what substances are made of, how they behave, and how they

can be transformed.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**LESSON 3: WHAT’S THE MATTER?**

A) Defining Matter

1. **matter** – anything that has mass and volume; anything that has substance and takes up

space

2. **mass** – the amount of substance, or material, in an object; can be measured

3. **volume** – the amount of space something takes up; can be measured

B) Is it Matter?

1. To determine if something is matter, it must have a mass and a volume that can be

measured. Even though gases are hard to see or feel, we can measure the

volume and mass of gases. However, things like sound and energy are not matter.

C) Measuring Matter

1. Measuring Mass: Use a balance to measure mass

2. Measuring Volume: Measure volume through geometric formulas or water displacement

3. **meniscus** – curvature at the top of a liquid in a container

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**LESSON 4: MASS COMMUNICATION – MASS AND VOLUME**

Question: How do you determine the masses and volumes of different substances?

A) Measuring Volume

1. Method 1: Using Geometric Formulas to Determine Volume

ex: a rectangular solid with the dimensions of 2.0 cm by 2.5 cm by 3.0 cm

2. Method 2: Using Water Displacement to Determine Volume

a) **water displacement:**

ex.

3. Important to know: 1 mL = 1 cm3

B) Comparing Mass and Volume

1. Example 1: Suppose you have two cubes. One cube is made of solid gold and the other cube

is made of solid plastic. The sides of the cube each measure 2.0 cm in length.

a) What is the volume of each cube? b) How much water will each cube displace?

2. Example 2: One cube is made of solid copper and another cube is made of solid glass. They

have exactly the same mass. How do their volumes compare?

**LESSON 5: ALL THAT GLITTERS – DENSITY**

A. The Definition of Density

1. **density:**

2. Units of mass, volume, and density

Mass Volume Density

3. Differences in density

a. How do differences in density explain these two pictures?

*Picture A Picture B*

[](http://images.google.com/imgres?imgurl=http://serc.carleton.edu/images/NAGTWorkshops/earlycareer/balance.gif&imgrefurl=http://serc.carleton.edu/NAGTWorkshops/earlycareer/balance/&usg=__a29aa47m5dMejGKaLQJ-dSGECD4=&h=449&w=489&sz=9&hl=en&start=1&um=1&tbnid=MsXnrjnvag2HiM:&tbnh=119&tbnw=130&prev=/images%3Fq%3Dbalance%26hl%3Den%26safe%3Dactive%26rlz%3D1T4ADBS_enUS294US298%26sa%3DN%26um%3D1)[](http://images.google.com/imgres?imgurl=http://media.bestofmicro.com/justice-balance,G-E-590-3.jpg&imgrefurl=http://www.tomsguide.com/us/slideshow/justice-balance,0101-590-0----jpg-.html&usg=__E0KFS3EgOUcc5mdCczBAf1HHTs0=&h=380&w=362&sz=10&hl=en&start=5&um=1&tbnid=B7K4HvKDPe9xwM:&tbnh=123&tbnw=117&prev=/images%3Fq%3Dbalance%26hl%3Den%26safe%3Dactive%26rlz%3D1T4ADBS_enUS294US298%26sa%3DN%26um%3D1)

B. Calculating Density

1. Mathematical Formula

2. Density example

a. Suppose you have a gold ring that weights 7.50 g and has a volume of

0.388 mL. What is its density?

b. Now, suppose you have a gold bracelet that weighs 24.5 g and has a volume of

1.27 mL. What is its density?

c. Based on the previous two calculations, does the density of a substance depend on

its size or shape? Explain.

C. Identifying Matter Using Density

1. Properties are:

a. **intensive properties**-

b. **extensive properties**-